

FORM-PTO-1390
(Rev. 12-29-99)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

**TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371**

027566-023

U.S. APPLICATION NO. (If known, see 37 C.F.R. 1.5)

UNASSIGNED 09/787738

INTERNATIONAL APPLICATION NO.

PCT/EP99/07067 MAR 22 2001

INTERNATIONAL FILING DATE

23 September 1999

PRIORITY DATE CLAIMED

25 September 1998

TITLE OF INVENTION

SIGNALLING IN A TELECOMMUNICATIONS SYSTEM

APPLICANT(S) FOR DO/EO/US

Miguel-Angel GARCIA-MARTIN and Juan Maria GARCIA GONZALES

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and the PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
 - a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☒ has been transmitted by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US)
- ☐ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
- ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
 - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ have been transmitted by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☒ have not been made and will not be made.
- ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
- ☐ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. below concern other document(s) or information included:

11. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A **FIRST** preliminary amendment.
 - ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
14. ☐ A substitute specification.
15. ☐ A change of power of attorney and/or address letter.
16. ☒ Other items or information:

International Preliminary Examination Report, PCT Demand, Unexecuted Declaration

U.S. APPLICATION NO. 09/787738 UNASSIGNED		INTERNATIONAL APPLICATION NO. PCT/EP99/07067		ATTORNEY'S DOCKET NUMBER 027566-023	
17. <input checked="" type="checkbox"/> The following fees are submitted:				CALCULATIONS	PTO USE ONLY
Basic National Fee (37 CFR 1.492(a)(1)-(5)): Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report prepared by the EPO or JPO \$1,000.00 (960) International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO \$860.00 (970) International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO \$710.00 (958) International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) \$690.00 (956) International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) \$100.00 (962)					
ENTER APPROPRIATE BASIC FEE AMOUNT =					
				\$ 860.00	
Surcharge of \$130.00 (154) for furnishing the oath or declaration later than months from the earliest claimed priority date (37 CFR 1.492(e)). 20 <input type="checkbox"/> 30 <input type="checkbox"/>				\$ -0-	
Claims	Number Filed	Number Extra	Rate		
Total Claims	8 -20 =	-0-	X\$18.00 (966)	\$ -0-	
Independent Claims	3 -3 =	-0-	X\$80.00 (964)	\$ -0-	
Multiple dependent claim(s) (if applicable)			+ \$270.00 (968)	\$ -0-	
TOTAL OF ABOVE CALCULATIONS =				\$	
Reduction for 1/2 for filing by small entity, if applicable (see below).				\$ -0-	
SUBTOTAL =				\$ 860.00	
Processing fee of \$130.00 (156) for furnishing the English translation later than months from the earliest claimed priority date (37 CFR 1.492(f)). 20 <input type="checkbox"/> 30 <input type="checkbox"/>				\$ -0-	
TOTAL NATIONAL FEE =				\$ 860.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 (581) per property +				\$ -0-	
TOTAL FEES ENCLOSED =				\$ 860.00	
				Amount to be:	
				refunded	\$
				charged	\$

a. ☐ Small entity status is hereby claimed.

b. ☒ A check in the amount of \$ 860.00 to cover the above fees is enclosed.

c. ☐ Please charge my Deposit Account No. 02-4800 in the amount of \$ _____ to cover the above fees. A duplicate copy of this sheet is enclosed.


d. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 02-4800. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

Ronald L. Grudziecki, Esq.
BURNS, DOANE, SWECKER & MATHIS, L.L.P.
P.O. Box 1404
Alexandria, Virginia 22313-1404
(703) 836-6620

Date: March 22, 2001


 SIGNATURE
 Steven M. duBois
 NAME
 35,023
 REGISTRATION NUMBER

09/787738

JC10 Rec'd PCT/PTO 22 MAR 2001

Patent

Attorney's Docket No. 027566-023

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of)
Miguel-Angel GARCIA-MARTIN et al.) Group Art Unit: UNASSIGNED
Application No.: UNASSIGNED) Examiner: UNASSIGNED
Filed: March 22, 2001)
For: SIGNALLING IN A)
TELECOMMUNICATIONS SYSTEM)

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to examination, please amend the above-identified application as follows:

IN THE CLAIMS:

Please replace claims 3-6 as follows.

3. (Amended) A method according to claim 1 and comprising determining the IP address and port number at the adaptation layer from a Destination Point Code (DPC) included in said addressing information.

4. (Amended) A method according to claim 1 and comprising obtaining the IP address and port number at the adaptation layer directly from a global title included in said addressing information.

5. (Amended) A method according to claim 1 and comprising monitoring at the adaptation layer the state of the signalling connection over the IP based network and reporting on this to the SCCP.

6. (Amended) A method according to claim 1 and comprising encapsulating at the adaptation layer the signalling and addressing information into a form suitable for further processing by a UDP/TCP layer disposed between the adaptation layer and the IP part.

REMARKS

The Examiner's attention is drawn to the amendments to the application made in the Preliminary Examination Report, and for the convenience of the Examiner the following items are submitted with this application.

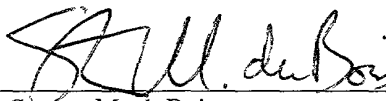
- A) International PCT Publication
- B) Preliminary Examination Report
- C) PCT Demand

The above changes to the claims have been made to delete multiple dependency of the claims, to round out the scope of patent protection being sought, and generally to place the claims in better condition for examination on the merits. These changes have been made in accordance with 37 C.F.R. § 1.121 as amended on November 7, 2000.

Respectfully submitted,

BURNS, DOANE, SWECKER & MATHIS, L.L.P.

By: _____



Steven M. duBois

Registration No. 35,023

P.O. Box 1404
Alexandria, Virginia 22313-1404
(703) 836-6620

Date: March 22, 2001

Attachment to Preliminary Amendment dated March 22, 2001

Marked-up Claims 3-6

3. (Amended) A method according to claim 1 [or 2] and comprising determining the IP address and port number at the adaptation layer from a Destination Point Code (DPC) included in said addressing information.

4. (Amended) A method according to claim 1 [or 2] and comprising obtaining the IP address and port number at the adaptation layer directly from a global title included in said addressing information.

5. (Amended) A method according to claim 1 [any one of the preceding claims] and comprising monitoring at the adaptation layer the state of the signalling connection over the IP based network and reporting on this to the SCCP.

6. (Amended) A method according to claim 1 [any one of the preceding claims] and comprising encapsulating at the adaptation layer the signalling and addressing information into a form suitable for further processing by a UDP/TCP layer disposed between the adaptation layer and the IP part.

Signalling in a Telecommunications SystemField of the Invention

The present invention relates to signalling in a telecommunications system and in particular, though not necessarily, to the transmission of signalling data in a Public Land Mobile Network.

Background to the Invention

In a telecommunications system, signalling equipment and signalling channels are required for the exchange of information between system elements or nodes. In particular, this internode signalling informs the nodes of what is to be performed when a telephone or data call is to be set up or released in so-called "circuit-switched" connections. Signalling is also often used to communicate information on the status of the system and of individual subscribers.

Modern telecommunications systems now largely make use of Common Channel Signalling (CCS) whereby signalling information is transmitted on one or more dedicated signalling channels, distinct from the channels used to carry actual user information (e.g. voice or data). An important feature of CCS is that the same signalling system may support services in a variety of existing telecommunications networks, e.g. Public Switched Telephone Network (PSTN), Integrated Services Digital Network (ISDN), and Public Land Mobile Networks (PLMN), as well as proposed future protocols such as B-ISDN, enhancing greatly the interoperability of networks supporting different protocols.

Currently, the predominant CCS is known as Signalling System Number 7 (SS7), defined in the ITU-T (International Telecommunications Union - Technical) recommendations starting with Q.700. SS7 is a packet switched system occupying one time slot per frame of the Time Division Multiple Access (TDMA) E.1 or T.1 transmission formats (the other time slots being available for user voice or data information). Individual signalling message packets (referred to as Message Signalling Units or MSUs) are associated with respective individual telephone calls. As only a relatively small amount of signalling information is associated with a single telephone call, a single SS7 channel is able to handle all signalling between two network nodes (termed "signalling points") for several thousands of calls. It is noted that the route taken by an MSU in the SS7 network may be the same as that over which the associated telephone call is established, or it may be different.

As already noted, SS7 (along with other CCS systems) is able to support a number of different telecommunications networks (e.g. PSTN, ISDN, PLMN). In signal processing terms, SS7 comprises a Message Transfer Part (MTP) which deals with the physical transfer of signalling information over the signalling network (MTP layer 1), message formatting, error detection and correction, etc (MTP layer 2), and message routing (MTP layer 3). SS7 also comprises user parts and application parts which allow several "users" (i.e. ISDN User Part, Telephony User Part, Mobile Application Part, etc) to send signals in the same signalling network.

Figure 1 illustrates a PLMN (GSM) having a Gateway Mobile Switching Centre (GMSC) 1 which provides an interface for the PLMN to "foreign" networks such as

ISDNs, PSTNs, and other PLMNs. An exemplary Mobile Station (MS), registered to the PLMN, is indicated by the reference numeral 2. A number of exemplary nodes within the PLMN are also shown including: the GMSC 1; a Mobile Switching Centre (MSC) 3; a Base Station Controller (BSC) 4; a Base Transceiver Station (BTS) 5; an Intelligent Network node (IN) 6; a Visitor Location Register (VLR) 7; a Home Location Register (HLR) 8; an Authentication Centre (AUC) 9; and an Equipment Identity Register (EIR) 10. A more complete description of a PLMN, and other aspects of telecommunication networks, is given in "Understanding Telecommunications", vols. 1 & 2, Studentlitteratur, Lund, Sweden (ISBN 91-44-00214-9).

Figure 1 indicates the various signalling interfaces which are used to signal between the network nodes detailed above. These interfaces include: the ISUP/TUP interfaces between the GMSC 1 and the foreign networks; the INAP interface used between the MSC 3 and Intelligent Network (IN) nodes; the MAP interface used between the MSC/GMSC 1,3 and PLMN specific nodes (VLR, HLR, AUC, EIR) 6-10; the BSSMAP used between the MSC 3 and the BSC 4; and the Abis interface between the BSC 4 and the BTS 5. Conventionally, all of these interfaces serve as user parts and application parts of an SS7 network, residing above the MTP layers. The resulting protocol stacks are illustrated in Figure 2.

In order to provide the INAP and MAP (as well as certain other application parts, e.g. OMAP, which also rely upon connectionless communication over the signalling network) with certain functions and protocols as well as a standard and common interface between the application parts and the network signalling service, a Transaction Capabilities Application Part (TCAP or TC) is interposed

between these application parts and the MTP. Furthermore, a Signalling Connection and Control Part (SCCP) is interposed between the TCAP and the MTP for controlling the signalling connection. The SCCP is also used by certain other application parts (referred to as SCCP users, e.g. BSSMAP) which do not use the services of the TCAP and which rely upon connection-oriented and/or connectionless communication over the signalling network.

SS7 makes use of addresses known as Destination Point Codes (DPCs) to route signalling data through the "visibility area" of a telecommunications network, the visibility area typically being the network itself together with the interfaces between the network and "foreign" networks under the control of other operators. A DPC is placed in the header of an MSU and is examined by a network signalling point (SP) upon receipt of the MSU to determine the next hop for the MSU en route to its destination. So-called Subsystem Numbers (SSNs) are used by SS7 to direct data to specific application parts (see below) and are also included in MSUs.

With reference to Figure 2, it is noted that routing between various application parts above the SCCP layer is achieved using so-called "global titles". A global title contains (amongst other things) a number dialled in the PLMN or the number of a roaming mobile station (for the specific example shown in Figure 1). The SCCP contains all the network and routing information required to analyse a global title and translate it into a DPC and, optionally, a Subsystem Number (SSN) which identify the next or final signalling point in the SS7 network.

Summary of the Present Invention

According to a first aspect of the present invention there is provided a method of transmitting signalling information in a telecommunications network between a pair of application parts, the method comprising;

passing the signalling information to a Signalling Connection Control Part (SCCP) arranged to segment the signalling information if necessary, and to encapsulate the information in one or more SCCP messages;

passing the encapsulated signalling information from the SCCP to an adaptation layer arranged to

determine an IP address and port number associated with said addressing information;

passing the signalling information and said IP address and port number to an Internet Protocol (IP) part and transmitting the signalling information over an IP network to said IP address in one or more IP datagrams;

decapsulating said signalling information at the destination associated with the IP address and at an adaptation layer identified by said port number; and

routing the decapsulated signalling information to the second user part.

The use of the IP based network for transmitting signalling information reduces the need for conventional signalling infrastructure (although this may still be used in part). IP based networks offer increased flexibility (e.g. routers of the network have self-updating routing tables) and reduced operating, maintaining, and engineering costs in comparison with conventional telecommunications signalling networks.

The method of the present invention is particularly applicable to Public Land Mobile Networks (PLMN), where said pair of application parts may be, for example, peer Mobile Application Parts (MAPs) or Intelligent Network Application Parts (INAPs) present at respective signalling nodes of the PLMN.

In certain embodiments of the invention, the SCCP performs a translation between said addressing information (e.g. a global title) and an associated Destination Point Code (DPC) and, optionally, a Subsystem Number (SSN). In this case, the IP address and port number are determined, at the adaptation layer, by way of the DPC, rather than directly from the global title. In other embodiments however, the IP address and

09787733-06304

port number are obtained at the adaptation layer directly from a global title.

Preferably, the adaptation layer is arranged to monitor the state of the signalling connection over the IP based network and to report on this to the SCCP.

Preferably, the signalling information is passed from the adaptation layer to the IP part via a UDP or TCP encapsulating layer. More preferably, the adaptation layer is arranged to encapsulate signalling and addressing information into a form suitable for further processing by the UDP or TCP layers.

The signalling information generated at the first application part may be passed to the SCCP via a Transaction Capabilities Application part.

Alternatively, the application part may pass information directly to the SCCP. It is noted that a function of the SCCP is to facilitate both connectionless and connection oriented communication over the signalling channel, in addition to its routing and encapsulation functions.

According to a second aspect of the present invention there is provided apparatus for transmitting signalling information in a telecommunications network between a pair of application parts, the apparatus comprising;

generating means for generating said signalling information at a first of said application parts, including addressing information associated with the second of the application parts;

a Signalling Connection Control Part (SCCP) arranged to receive said signalling information and to segment the signalling information if necessary, and to encapsulate the information in one or more SCCP messages;

an adaptation layer arranged to receive the encapsulated signalling information and to determine an IP address and port number associated with said addressing information;

an Internet Protocol (IP) part receiving the signalling information and said IP address and port number and for arranging transmission of the signalling information over an IP network to said destination IP address in one or more IP datagrams;

an adaptation layer at the destination associated with the IP address, and identified by said port number, for decapsulating said signalling information; and

routing means for routing the signalling information to the second user part.

According to a third aspect of the present invention there is provided a gateway node for coupling signalling information from a common channel signalling (CCS) network of a telecommunications system, to an Internet Protocol (IP) based network, the gateway node comprising:

a Message Transfer Part (MTP) arranged to receive signalling information over the CCS network;

a Signalling Connection Control Part (SCCP) arranged to receive said signalling information from the MTP whilst controlling the signalling connection over the CCS network;

an adaptation layer arranged to receive said signalling information from the SCCP in the form of one or more SCCP messages, to determine an IP address and port number associated with a global title or Destination Port Code (DPC) included in the SCCP message(s), and to control the connection over the IP based network;

an IP layer for receiving the signalling information and the IP address and port number from the adaptation layer and for arranging for transmission of

the signalling information over the IP based network in the form of IP datagrams.

Brief Description of the Drawings

For a better understanding of the present invention and in order to show how the same may be carried into effect reference will now be made, by way of example, to the accompanying drawings, in which:

Figure 1 illustrates schematically a GSM network together with the signalling protocols used therein;

Figure 2 illustrates schematically the signal processing layers of an SS7 protocol of the network of Figure 1;

Figure 3 illustrates schematically the use of a TCP/IP network to transmit signalling information in a telecommunications network; and

Figure 4 illustrates signalling protocol layers present at nodes of the telecommunications network of Figure 3.

Detailed Description of Certain Embodiments

The general structure in terms of signalling nodes and signalling interfaces of a GSM PLMN has already been described above with reference to Figures 1 and 2. Figure 3 shows various nodes of the GSM PLMN where it is assumed, for the purpose of this discussion, that each of these nodes comprises an application part (e.g. MAP, INAP) having a conventional composition such that it can be supported by SS7 for the sending of signalling information to a peer application part at some other node. Considering in particular the MSCs 3a, 3b and the GMSC 1, these nodes are connected to a conventional SS7 network 11 for the purpose of communicating signalling information.

0036739-0000

Intelligent network and mobile network specific nodes, including the IN node 6, VLR 7, HLR 8, AUC 9, and EIR 10, each have application parts (and in particular MAP and INAP) similarly constructed for peer-to-peer communication via SS7. However, these nodes each comprise an additional interface which enables them to communicate signalling information via an IP network 12. In order to enable interworking of the SS7 connected nodes and the IP network connected nodes, the two signalling networks 11,12 are connected by a gateway node 13.

Figure 4 shows schematically the protocol layers present at a node connected to the IP network 12 (Node 1), at the gateway node 13 (Node 2), and at a node connected to the SS7 network 11 (Node 3). Of the layers shown, the INAP/MAP, TCAP, SCCP, TCP/UDP, IP, physical layer, and MTP are substantially conventional in structure and therefore will not be described in detail. Rather, the reader should make reference to the literature including "Understanding Telecommunications", vols. 1 & 2, Studentlitteratur, Lund, Sweden (ISBN 91-44-00214-9), and the ITU-T (International Telecommunications Union - Technical) recommendations starting with Q.700 which define Signalling System Number 7 (SS7). The present discussion is concerned in the main with the Adaptation layer which enables the TCP/IP and physical layers to replace the MTP, such that peer SCCPs can communicate over the IP network 12.

As has already been discussed above, MSUs are routed to a signalling point in an SS7 network using Destination Point Codes (DPCs) which are attached to each of the MSUs. Within a signalling point, messages are directed to a specific application (e.g. HLR, VLR, etc) on the

basis of a Subsystem Number (SSN) also attached to the MSU. On the other hand, datagrams in an IP network are routed to a destination machine on the basis of an IP address, and to an application running on a particular machine on the basis of an IP port number. A main function of the Adaptation layer therefore is to translate from DPCs to IP addresses and port numbers, a process which is achieved using a database associating DPCs and IP addresses/port numbers. It is noted that translation in the reverse direction, i.e. from IP addresses/port numbers to DPCs, is not normally necessary as the MSU will in any case contain the DPC (or a global title from which the DPC can be determined).

At Node 1, for signalling data to be transmitted to Node 3, the adaptation layer determines an IP address and port number associated with the DPC/SSN contained in the message "primitive" received from the SCCP layer (this primitive is referred to as an SCCP message). The Adaptation layer then encapsulates the primitive into a format which is acceptable to the TCP (or UDP layer) before passing the information to the TCP (or UDP) layer. A further function of the Adaptation layer is to monitor the state of the connection between the two communicating peer application parts. For example, if communication between the application parts breaks down, and cannot be re-established, then the Adaptation layer may report this to the SCCP. It will be appreciated that the Adaptation layer communicates with the SCCP in a manner identical to that of the MTP.

After processing by the TCP (or UDP) layer, the messages are passed to the IP layer, the main function of which is to handle routing of datagrams over the IP network.

The messages transmitted over the IP network 12 have the following structure:

Physical header	IP header	UDP/TCP header	SIO	SCCP header	TCAP header	INAP/MAP data
--------------------	--------------	-------------------	-----	----------------	----------------	------------------

where SIO is the Service Information Octet (which, in certain circumstances, may be omitted).

At the gateway node 13 (Node 2 in Figure 4), the Adaptation layer is interposed between the TCP-UDP/IP layers and the SCCP. The adaptation layer provides again for translation between DPCs and IP addresses/port numbers. Thus, for a signalling datagram received over the IP network 12, the Adaptation layer decapsulates the message and passes it to the SCCP for further processing.

For transmission over the SS7 network 11, the SCCP passes the primitive to the MTP which handles transmission in a known manner. Similarly, the protocol layers at the receiving node (Node 3) correspond to the conventional SS7 structure.

It will be appreciated by the skilled person that various modifications may be made to the above described embodiment without departing from the scope of the present invention. For example, the connectivity of the network nodes shown in Figure 3 may be varied, such that certain IN/PLMN specific nodes are connected to the SS7 network, whilst the MSCs and/or the GMSC may be connected to the IP network. It may also be the case that nodes are connected to both the SS7 network and the IP network, such that one network provides a back-up for the other network. It is also possible to connect all nodes to two or more SS7 networks, with these networks being connected together via an IP based networks and a number of SS7/IP gateway nodes.

Claims

1. A method of transmitting signalling information in a telecommunications network between a pair of application parts, the method comprising;

generating said signalling information at a first of said application parts, including addressing information associated with the second of the application parts;

passing the signalling information to a Signalling Connection Control Part (SCCP) arranged to segment the signalling information if necessary, and to encapsulate the information in one or more SCCP messages;

passing the encapsulated signalling information from the SCCP to an adaptation layer arranged to determine an IP address and port number associated with said addressing information;

passing the signalling information and said IP address and port number to an Internet Protocol (IP) part and transmitting the signalling information over an IP network to said IP address in one or more IP datagrams;

decapsulating said signalling information at the destination associated with the IP address and at an adaptation layer identified by said port number; and

routing the decapsulated signalling information to the second user part.

2. A method according to claim 1, wherein said pair of application parts are peer Mobile Application Parts (MAPs) or Intelligent Network Application Parts (INAPs) present at respective signalling nodes of a Public Land Mobile Network (PLMN).

3. A method according to claim 1 or 2 and comprising determining the IP address and port number at the

adaptation layer from a Destination Point Code (DPC) included in said addressing information.

4. A method according to claim 1 or 2 and comprising obtaining the IP address and port number at the adaptation layer directly from a global title included in said addressing information.

5. A method according to any one of the preceding claims and comprising monitoring at the adaptation layer the state of the signalling connection over the IP based network and reporting on this to the SCCP.

6. A method according to any one of the preceding claims and comprising encapsulating at the adaptation layer the signalling and addressing information into a form suitable for further processing by a UDP/TCP layer disposed between the adaptation layer and the IP part.

7. Apparatus for transmitting signalling information in a telecommunications network between a pair of application parts, the apparatus comprising;

generating means for generating said signalling information at a first of said application parts, including addressing information associated with the second of the application parts;

a Signalling Connection Control Part (SCCP) arranged to receive said signalling information and to segment the signalling information if necessary, and to encapsulate the information in one or more SCCP messages;

an adaptation layer arranged to receive the encapsulated signalling information and to determine an IP address and port number associated with said addressing information;

an Internet Protocol (IP) part receiving the signalling information and said IP address and port

number and for arranging transmission of the signalling information over an IP network to said destination IP address in one or more IP datagrams;

an adaptation layer at the destination associated with the IP address, and identified by said port number, for decapsulating said signalling information; and

routing means for routing the signalling information to the second user part.

8. A gateway node for coupling signalling information from a common channel signalling (CCS) network of a telecommunications system, to an Internet Protocol (IP) based network, the gateway node comprising:

a Message Transfer Part (MTP) arranged to receive signalling information over the CCS network;

a Signalling Connection Control Part (SCCP) arranged to receive said signalling information from the MTP whilst controlling the signalling connection over the CCS network;

an adaptation layer arranged to receive said signalling information from the SCCP in the form of one or more SCCP messages, to determine an IP address and port number associated with a global title or Destination Port Code (DPC) included in the SCCP message(s), and to control the connection over the IP network;

an IP layer for receiving the signalling information and the IP address and port number from the adaptation layer and for arranging for transmission of the signalling information over the IP based network in the form of IP datagrams.

09227739:063904

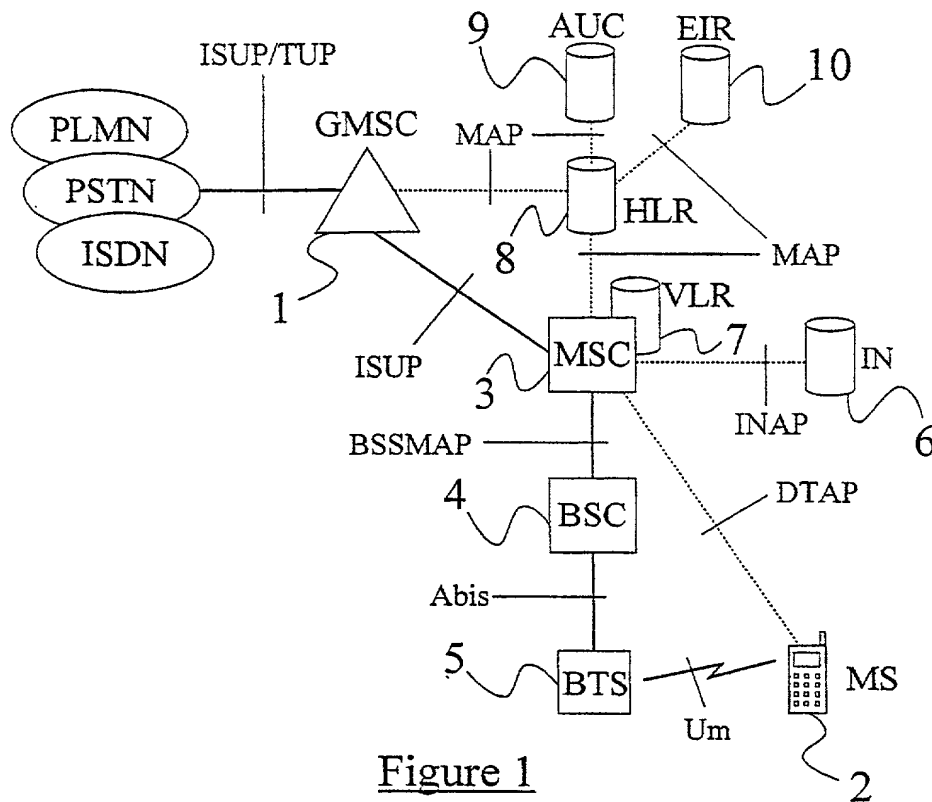


Figure 1

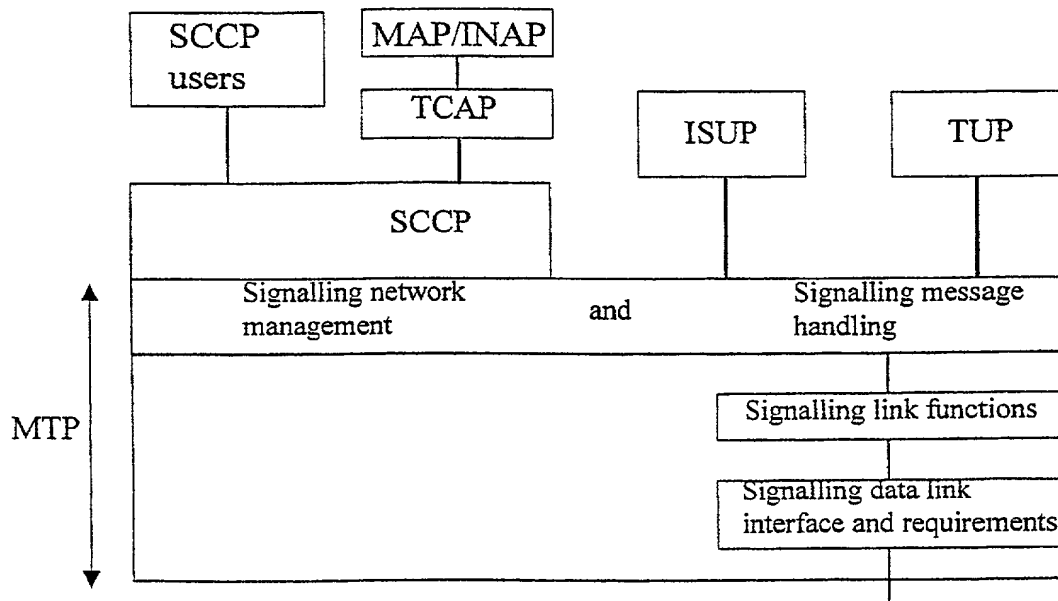
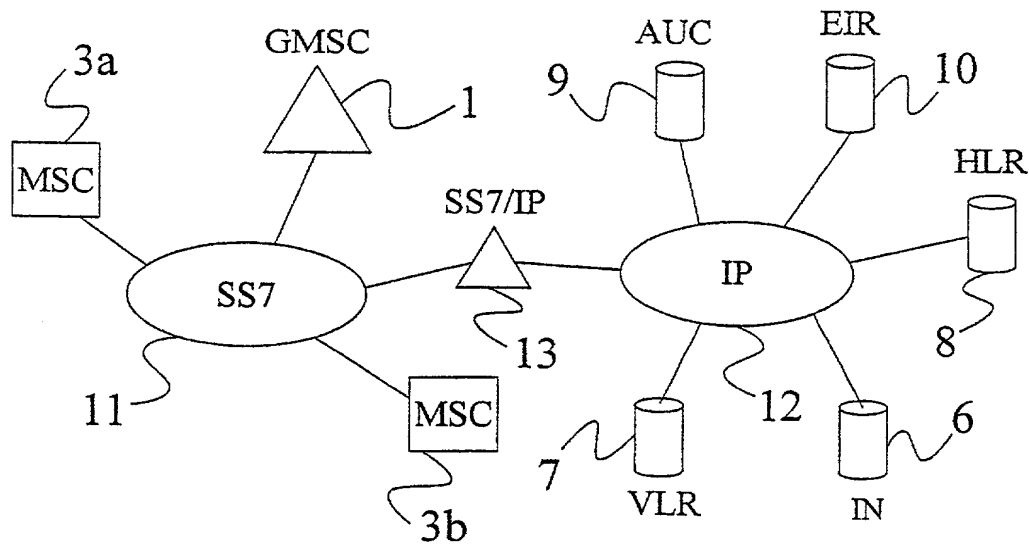
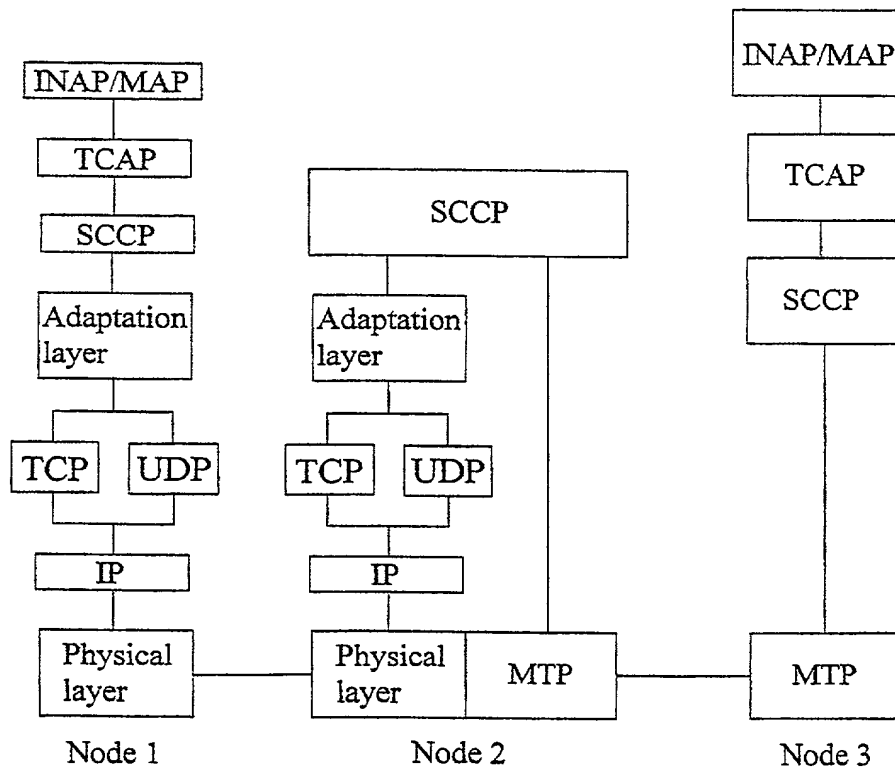


Figure 2

Figure 3Figure 4

COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY
(Includes Reference to Provisional and PCT International Applications)

Attorney's Docket No.
027566-023

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name;

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

SIGNALLING IN A TELECOMMUNICATIONS SYSTEM

the specification of which (check only one item below):

☐ is attached hereto.

☒ was filed as United States application

Number 09/787,738

on March 22, 2001

and was amended

on _____ (if applicable).

☐ was filed as PCT international application

Number _____

on _____

and was amended

on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 (a)-(e) of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed:

PRIOR FOREIGN/PCT APPLICATION(S) AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. §119:

COUNTRY (if PCT, indicate "PCT")	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 35 U.S.C. §119
Finland	982074	25 September 1998	<u>X</u> Yes _ No
			_ Yes _ No
			_ Yes _ No
			_ Yes _ No
			_ Yes _ No

I hereby claim the benefit under Title 35, United States Code § 119(e) of any United States provisional application(s) listed below.

(Application Number)

(Filing Date)

(Application Number)

(Filing Date)

COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY (CONT'D)
(Includes Reference to Provisional and PCT International Applications)

Attorney's Docket No.
027566-023

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) or PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose to the Office all information known to me to be material to the patentability as defined in Title 37, Code of Federal Regulations §1.56, which became available between the filing date of the prior application(s) and the national or PCT international filing date of this application:

PRIOR U.S. APPLICATIONS OR PCT INTERNATIONAL APPLICATIONS DESIGNATING THE U.S. FOR BENEFIT UNDER 35 U.S.C. §120:

U.S. APPLICATIONS		STATUS (check one)		
U.S. APPLICATION NUMBER	U.S. FILING DATE	PATENTED	PENDING	ABANDONED
PCT APPLICATIONS DESIGNATING THE U.S.				
PCT APPLICATION NO.	PCT FILING DATE	U.S. APPLICATION NUMBERS ASSIGNED (if any)		
PCT/EP99/07067	23 September 1999	09/787,738	X	

I hereby appoint the following attorneys and agent(s) to prosecute said application and to transact all business in the Patent and Trademark Office connected therewith and to file, prosecute and to transact all business in connection with international applications directed to said invention:

William L. Mathis 17,337
Robert S. Swecker 19,885
Platon N. Mandros 22,124
Benton S. Duffett, Jr. 22,030
Norman H. Stepno 22,716
Ronald L. Grudziecki 24,970
Frederick G. Michaud, Jr. 26,003
Alan E. Kopecki 25,813
Regis E. Slutter 26,999
Samuel C. Miller, III 27,360
Robert G. Mukai 28,531
George A. Hovanec, Jr. 28,223
James A. LaBarre 28,632
E. Joseph Gess 28,510
R. Danny Huntington 27,903

Eric H. Weisblatt 30,505
James W. Peterson 26,057
Teresa Stanek Rea 30,427
Robert E. Krebs 25,885
William C. Rowland 30,888
T. Gene Dillahunty 25,423
Patrick C. Keane 32,858
B. Jefferson Boggs, Jr. 32,344
William H. Benz 25,952
Peter K. Skiff 31,917
Richard J. McGrath 29,195
Matthew L. Schneider 32,814
Michael G. Savage 32,596
Gerald F. Swiss 30,113
Charles F. Wieland III 33,096

Bruce T. Wieder 33,815
Todd R. Walters 34,040
Ronni S. Jillhons 31,979
Harold R. Brown III 36,341
Allen R. Baum 36,086
Steven M. duBois 35,023
Brian P. O'Shaughnessy 32,747
Kenneth B. Leffler 36,075
Fred W. Hathaway 32,236
Wendi L. Weinstein 34,456
Mary Ann Dillahunty 34,576



21839

and:

Address all correspondence to:



21839

Ronald L. Grudziecki, Esq.
BURNS, DOANE, SWECKER & MATHIS, L.L.P.
P.O. Box 1404
Alexandria, Virginia 22313-1404

Address all telephone calls to: Steven M. duBois at (703) 836-6620.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY (CONT'D)
(Includes Reference to Provisional and PCT International Applications)

Attorney's Docket No.
027566-023

1-00 FULL NAME OF SOLE OR FIRST INVENTOR Miguel-Angel GARCIA-MARTIN		SIGNATURE <i>Miguel A Garcia</i>	DATE 17-05-01
RESIDENCE Pase Esperanza 8, esc. 3, 7-B, E-28005 Madrid, SPAIN <i>ESX</i>		CITIZENSHIP Spain	
POST OFFICE ADDRESS Pase Esperanza 8, esc. 3, 7-B, E-28005 Madrid, SPAIN			
2-00 FULL NAME OF SECOND JOINT INVENTOR, IF ANY Juan Maria GARCIA GONZALES		SIGNATURE <i>[Signature]</i>	DATE 21-05-01
RESIDENCE Banos de Montemayor 6, 1 B, E-28005 Madrid, SPAIN <i>ESX</i>		CITIZENSHIP Spain	
POST OFFICE ADDRESS Banos de Montemayor 6, 1 B, E-28005 Madrid, SPAIN			
FULL NAME OF THIRD JOINT INVENTOR, IF ANY		SIGNATURE	DATE
RESIDENCE		CITIZENSHIP	
POST OFFICE ADDRESS			
FULL NAME OF FOURTH JOINT INVENTOR, IF ANY		SIGNATURE	DATE
RESIDENCE		CITIZENSHIP	
POST OFFICE ADDRESS			
FULL NAME OF FIFTH JOINT INVENTOR, IF ANY		SIGNATURE	DATE
RESIDENCE		CITIZENSHIP	
POST OFFICE ADDRESS			
FULL NAME OF SIXTH JOINT INVENTOR, IF ANY		SIGNATURE	DATE
RESIDENCE		CITIZENSHIP	
POST OFFICE ADDRESS			
FULL NAME OF SEVENTH JOINT INVENTOR, IF ANY		SIGNATURE	DATE
RESIDENCE		CITIZENSHIP	
POST OFFICE ADDRESS			
FULL NAME OF EIGHTH JOINT INVENTOR, IF ANY		SIGNATURE	DATE
RESIDENCE		CITIZENSHIP	
POST OFFICE ADDRESS			